

## WHAT IS CLAIMED IS:

1. A steering control device including a steering wheel steering mechanism having a steering actuator that imparts a steering reaction force to a steering wheel, and a vehicle wheel steering mechanism having a vehicle wheel steering actuator that drives a vehicle wheel steering shaft, comprising:
  - a steering angle sensor that detects a steering angle  $\theta$  of the steering wheel; and
  - a steering change amount sensor that detects a steering change amount  $X_a$  in the vehicle wheel steering mechanism; wherein
  - the steering wheel steering mechanism includes an end-of-movement reaction force generation unit that respectively generates, in a vicinity of an upper limit point  $\theta_E$  of the steering angle  $\theta$  and a vicinity of a lower limit point  $-\theta_E$  of the steering angle  $\theta$ , a virtual contact resistance force that inhibits the steering angle  $\theta$  from exceeding threshold values of a predetermined permissible range ( $-\theta_E \leq \theta \leq \theta_E$ ) of the steering angle  $\theta$ , based on the steering angle  $\theta$ , the steering change amount  $X_a$  or a command value  $X_n$  for the steering change amount  $X_a$ .
2. The steering control device according to claim 1, wherein the steering control device is configured such that the steering wheel steering mechanism and the vehicle wheel steering mechanism are mechanically separate, and are operationally connected by an electronic mechanism rather than by a mechanical connection.
3. The steering control device according to f claim 2, further comprising:
  - a steering angle threshold value variation unit that dynamically changes the upper limit point  $\theta_E$  and the lower limit point  $-\theta_E$  of the permissible range ( $-\theta_E \leq \theta \leq \theta_E$ ), based on a vehicle speed  $v$ .
4. The steering control device according claim 3, further comprising:
  - a steering change amount threshold value variation unit that dynamically changes respective upper and lower limits of a permissible range ( $-X_E \leq X_n \leq X_E$ ) of the command value  $X_n$ , based on the vehicle speed  $v$ .
5. The steering control device according to claim 2, further comprising:

a steering change amount threshold value variation unit that dynamically changes respective upper and lower limits of a permissible range ( $-X_E \leq X_n \leq X_E$ ) of the command value  $X_n$ , based on the vehicle speed  $v$ .

5            6.        The steering control device according claim 1, further comprising:  
                  a steering angle threshold value variation unit that dynamically  
 changes the upper limit point  $\theta_E$  and the lower limit point  $-\theta_E$  of the permissible  
 range ( $-\theta_E \leq \theta \leq \theta_E$ ), based on a vehicle speed  $v$ .

10           7.        The steering control device according to claim 6, further comprising:  
                  a steering change amount threshold value variation unit that dynamically  
 changes respective upper and lower limits of a permissible range ( $-X_E \leq X_n \leq X_E$ ) of  
 the command value  $X_n$ , based on the vehicle speed  $v$ .

15           8.        The steering control device according claim 1, further comprising:  
                  a steering change amount threshold value variation unit that dynamically  
 changes respective upper and lower limits of a permissible range ( $-X_E \leq X_n \leq X_E$ ) of  
 the command value  $X_n$ , based on the vehicle speed  $v$ .

20           9.        The steering control device according to claim 1, further comprising:  
                  a vehicle wheel steering limiter for inhibiting or preventing a  
 command value for the vehicle wheel steering actuator from exceeding threshold  
 values, this vehicle wheel steering limiter being configured from a steering angle  
 limiter for inhibiting the steering angle  $\theta$  from exceeding threshold values.

25           10.      The steering control device according to claim 1, wherein the vehicle  
 wheel steering limiter for inhibiting or preventing a command value for the vehicle  
 wheel steering actuator from exceeding the threshold values is configured from a  
 position command limiter for inhibiting the command value  $X_n$  from exceeding  
 30 threshold values.